Original Research Article

Effect of Excess Consumption of Caffeine on Cardiovascular Status

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Abstract

Objective: This study was done to find whether excess consumption of caffeine containing beverage and other product on daily bases really have bad effect on our cardiovascular system or not . **Method:** All volunteer were divided into two groups depending on number of cups of coffee or other caffeine containing beverages and chocolates consumed by them. Group 1 was habitual drinkers and Group 2 was non-habitual drinkers. Then their basal HR, SBP and DBP were recorded and compared. Then same parameters were recorded at various time intervals after **Queens College Step Test** to find the recovery time of cardiovascular system**.Result:** There were no significant difference in mean basal HR, SBD and DBP between the groups. HR, SBP and DBP were almost same at various time interval after **Queens College Step Test,** except at time interval 5 sec. – 20 sec. where DBP was significantly higher in habitual caffeine drinkers compared to non habitual caffeine drinkers.**Conclusion:** From this study it has been concluded that caffeine doesn't causes any harmful effect on cardiovascular system.

Keywords: HR (heart rate) SBP (systolic blood pressure) and DBP (diastolic blood pressure).

Introduction

Caffeine acts as a central nervous system (CNS) stimulant in humans. It temporarily prevents drowsiness, reduce physical fatigue and restore alertness.Caffeine also causes increased wakefulness, faster and clearer flow of thought, increased focus, and better general body coordination and improvement in performance during sleep deprivation but may also causes insomnia. Because of above given beneficial effect of caffeine, caffeine containing beverages and other product, such as coffee, tea, soft drinks, energy drinks, chocolates, are enjoyed by huge population worldwide[1-3]. But excess consumption of caffeine containing beverages and other product, can causes a condition known as caffeinism. In caffeinism, person may have caffeine dependency with unpleasant physical and mental conditions including nervousness, irritability, restlessness, insomnia, headache, and heart palpitations[4].In this study, effort was made to find whether excess consumption of caffeine containing beverage and other product on daily bases really have bad effect on our cardiovascular system or not.

Materials and Methods

- The present study was carried out in the Department of Physiology, MGM Medical College, Kamothe, Navi Mumbai after the approval from the Institutional ethics committee.

40 volunteers having age range from 18 to 30 yrs. participated in this study

- Two groups were made depending on number of cups of coffee or other caffeine containing beverages and chocolates consumed by them.
- Group 1 was habitual drinkers- 20 volunteers (male 8, female 12).
- Group 2 was non habitual drinkers -20 volunteers (male 14, female 6).

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- Volunteers who are taking three cups of coffee or two cups of coffee plus any other caffeine drinks or caffeine containing dry chocolates or food items per day on regular basis were included in **group I (habitual drinkers).**
- Volunteers who are taking no coffee or taking less than three cups of coffee per day or not consuming chocolates and any other caffeine containing food items on regular bases were in **group II (non habitual drinkers).**
- All the participants of both groups were non-smokers, non-alcoholic and non-diabetic. They were healthy without any illness. They were not on any medication therapy or placebo treatment.
- The smokers, alcoholics, diabetics, and subjects having poor physical, mental and psychological well-being were excluded from the study.

Methodology of each objective

- Participants were called in department of physiology between 10 am to 11 am.
- First of all, procedures were explained and demonstrated to the volunteers and then their written consent was taken.
- Height was measured in cm with help of wall mounted measuring tape and weight was taken in kg with help of digital weighing machine and BMI was calculated.
- After that resting heart rate (HR), Systolic Blood pressure (SBP) and diastolic Blood pressure (DBP) were recorded with help of OMRON digital sphygmomanometer.
- Then volunteers were made to do Queens College step test after that heart rate and blood pressure were recorded with help of OMRON digital sphygmomanometer at various time intervals to find the recovery time.

Observation and Result

The Data was analyzed using SPSS 19.0

In the present study, all data collected were statically analyzed using **SPSS 19.0.** software. The data was presented using descriptive statistics such as mean, standard deviation(SD), standard error of mean (SEM) followed by multiple bar charts. Further comparison between habitual and non-habitual groups was done using

independent sample t-test. The recorded values were expressed as Mean±SD. The level of significance was set at 5%. All p–values less than 0.05 were considered to be significant.

Table 1: Comparison of Age, Height, Weight and BMI Between Habitual and non-habitual group

Variable	Group	Mean	SD	SEM	t-stat	df	Mean Diff.	P-value
Age	Habitual	21.300	3.342	0.747	-0.381	38	-0.4	0.705
	Non-habitual	21.700	3.294	0.737				
BMI (weight/m2)	Habitual	23.105	4.703	1.052	1.63	38	2.125	0.111
	Non-habitual	20.980	3.428	0.767				

Table 2: Shows comparison of HR (heart rate) at rest and various times interval after Queens College Step Test among Habitual and Non-habitual Group.

Parameter	Group	Mean	SD	SEM	Mean Diff.	t-stat	df	p-value
HR Resting	Habitual	76.800	7.445	1.665	2.500	.921	38	.363
	Non-habitual	74.300	9.587	2.144				
HR (5 sec to 20 sec)	Habitual	139.350	17.452	3.902	-0.750	-.096	38	.924
	Non-habitual	140.100	30.201	6.753				
HR (1Min to 1.5 Min)	Habitual	118.850	18.053	4.037	-0.500	-.075	38	.940
	Non-habitual	119.350	23.547	5.265				
HR (2Min to 2.5 Min)	Habitual	106.500	11.790	2.636	-2.900	-.598	38	.554
	Non-habitual	109.400	18.210	4.072				
HR (3 Min to 3.5 Min)	Habitual	103.800	12.602	2.818	0.150	.032	38	.975

Table 3: Showing comparison of SBP (systolic blood pressure) at rest and various times interval after Queens College Step Test among Habitual and Non-habitual Group

Parameter	Group	Mean	SD	SEM	Mean Diff.	t-stat	df	p-value
SBP Resting	Habitual	109.600	13.751	3.075	-4.250	-.965	38	.341
	Non-habitual	113.850	14.098	3.153				
SBP (5 sec to 20 sec)	Habitual	136.200	15.460	3.457	-2.250	-.469	38	.642
	Non-habitual	138.450	14.859	3.323				
SBP (1Min to 1.5 Min)	Habitual	137.900	14.404	3.221	9.800	1.548	38	.130
	Non-habitual	128.100	24.372	5.450				
SBP (2 Min to 2.5 Min)	Habitual	123.950	21.308	4.765	-4.900	-.945	38	.350
	Non-habitual	128.850	9.121	2.039				
SBP (3Min to 3.5 Min)	Habitual	123.050	14.641	3.274	-2.500	-.686	38	.497
	Non-habitual	125.550	7.156	1.600				

Table 4: Showing comparison of DBP (diastolic blood pressure) at rest and various times interval after Queens College Step Test among Habitual and Non-habitual Group

Parameter	Group	Mean	SD	SEM	Mean Diff.	t-stat	df	p-value
DBP Resting	Habitual	69.300	8.504	1.902	0.250	.092	38	.928
	Non-habitual	69.050	8.763	1.959				
DBP (5 sec to 20 sec)	Habitual	79.800	13.698	3.063	8.650	2.418	38	.021*
	Non-habitual	71.150	8.267	1.849				
DBP (1 Min to 1.5 Min)	Habitual	73.450	8.457	1.891	3.650	1.277	38	.209
	Non-habitual	69.800	9.589	2.144				
DBP (2 Min to 2.5 Min)	Habitual	71.450	11.714	2.619	2.500	.628	38	.534
	Non-habitual	68.950	13.395	2.995				
DBP (3Min to 3.5 Min)	Habitual	69.100	12.904	2.885	0.900	.256	38	.799

Discussion

This study has been done to find the effect of caffeine on HR, SBP, and DBP of habitual and non habitual caffeine drinkers at rest and at various time intervals after exercise (*Queens College Step Test)* .

In this study there was no significant difference in mean age, and BMI of both the groups. (table 1).

HR, SBP, and DBP of both habitual and non habitual caffeine drinkers at rest were almost same without any significant difference. (Table 2, 3, 4).

After exercise (Queens College Step Test) HR, SBP and DBP were recorded in both the groups at various time intervals (5 sec-20 sec, 1-1.5 min, 2- 2.5 min and 3 – 3.5 min). The increase in HR and SBP in both the groups after exercise were similar at various time intervals and there was no significant difference in HR and SBP of both the groups (table 2, 3, 4).

The DBP was significantly increased at time interval of (5 sec – 20 sec) after exercise in habitual caffeine drinkers compared to non habitual caffeine drinkers (table 4).

The DBP of both the groups at other time intervals after exercise (1-1.5 min, 2-2.5 min, 3-3.5 min) was almost similar and there was no significant difference of DBP in both the groups (table 4).

Myers observed that caffeine consumption did not cause any persistent increase in BP in caffeine drinkers. In non habitual caffeine drinkers tolerance develops in 2 to 3 days and BP returns to normal levels[5].Höfer and Bättig observed that there is no increase in BP in habitual caffeine drinkers[6].Floegel and colleagues observed in their prospective EPIC study that there was no

significant change in SBP and DBP in people who were consuming coffee ranging from 1 cup to more than 4 cup per day[7].Superko and colleagues observed no significant change in heart rate and BP in caffeinated coffee drinkers.He Lang and colleagues found an increase in SBP in habitual caffeine drinkers.Lang and colleagues in another study noted an increase in DBP in caffeine drinkers.Narkiewicz and colleagues found higher SBP in habitual caffeine drinker.Hu and colleagues found an increase in SBP and DBP in habitual caffeine drinker (in both men and women)

Periti and colleague noted a significant decrease in SBP and DBP in habitual caffeine drinkers. Salvaggio and colleagues noted a decrease in SBP in habitual caffeine drinkers.

Karchoff and colleagues noted a decrease in SBP and DBP in habitual caffeine drinker[8-15].

Conclusion

From this study it has been concluded that caffeine don't cause any harmful effect on cardiovascular system.

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